

Semi-Annual Progress Report

January 1, 1966 - June 30, 1966

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Title: Nutritional Requirements and Breeding Behavior of PerognathusHC ⁸ 1.00
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Cat 041. Breeding Behavior:

Our efforts to induce estrus in our colony of pocket mice by the manipulation of dietary factors has so far not met with success. The following dietary regimens, singly or in combination, have been tried out: water-soaked seeds, lettuce and carrots to provide additional moisture; various species of *Opuntia* cactus to simulate vegetation found during spring time in their natural habitat; wheat sprouts for vitamin E and possibly unknown plant steroids; and hulled sunflower seeds soaked in "Avitron" an aqueous vitamin supplement, primarily to supply generous amounts of vitamins A and E. The animals appear to consume these diets satisfactorily and are looking well and alert. We have, however, not seen any females in estrus since late November 1965.

As mentioned in the previous semi-annual progress report, we have kept all animals under a 14-hour day - 10-hour night regimen. We now suspect that this may not have been a happy choice because it is possible that it is a winter photoperiod or the change from "winter" to "spring" which triggers the hormonal events leading to estrus. We have just obtained a large number of freshly trapped animals. They are kept under "natural" light conditions and we are repeating the nutritional experiments with these groups of mice.

2. Manipulation of the Climatic Factors of the Environment:

A walk-in controlled environmental chamber is on order from Sherer-Gillette, Marshall, Michigan. Delivery date is before July 1. After erection and check-out of performance it is planned to use the chamber initially to attempt to define more closely the microclimate in which the mice find themselves. This will be done by measuring temperature and humidity in artificial burrows exposed to desert conditions existing at different times of the year.

3. Nutritional Requirements:

As a first step in the determination of the requirement of individual nutrients it is necessary: a) to establish criterions of "requirements" and b) to have available a satisfactory diet which can be modified in respect to the nutrient or nutrients of interest. The most commonly used criterion for nutritional adequacy is that of growth. Since we have no growing animals, or only sporadically so, we are using weight maintenance as the criterion, supplemented by observations of coat, eyes, teeth and general behavior of the animals. By these measurements it appears from preliminary experiments with P. Bailey that Purina mouse-breeder chow may be a satisfactory basal diet. A synthetic diet modified from Bell (1) and containing

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20% casein, 10% CSO*, 10% sucrose, starch, vitamins and minerals has not been accepted by the mice equally well, probably because of an undesirable physical consistency (the pellets are "crumbly"). This problem will be remedied by the use of a pelleting machine. It is planned to use this or a similar basal diet for the determination of minimal protein requirement, the effect of changes in concentration of certain amino acids, especially those containing sulfur and of some of the vitamins and minerals.

We have assembled a simple apparatus to be used to estimate oxygen consumption and therefore caloric requirement.

Summary:

1. A number of nutritional supplements have been tried out in an effort to induce and maintain estrus. No success has been scored, possibly due to the maintenance of an unfavorable photoperiod.
2. Purina mouse breeder chow and a fully synthetic diet have been found to maintain weight in a group of P. Baileys.
3. The "climatron" has been ordered and is on its way.
4. Plans for the immediate future include: observation of a large group of freshly trapped mice kept under natural light conditions for natural estrus. Use of the climatron to define the microclimate of the mice in their natural habitat. Extension of the use of synthetic diets to P. longimembris and P. penicillatus. Determination of caloric, minimum protein and sulfur-containing amino acid requirements as well as of other selected nutrients.

Reference:

In Nutrient Requirements of Laboratory Animals, National Academy of Sciences, NRC, Publ. #990, p. 46, 1962.

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CSO = cottonseed oil.

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